

Examiner's opinions concerning lack of novelty are erroneous and that the invention set forth in claims 1-17 is patentably distinct from the cited art.

As amended, Claim 1 is directed to a self-imaging multimode interference based coupler comprising one or more input access waveguides for inputting an optical signal into the coupler and one or more output access waveguides for outputting images of the optical signal. This coupler further comprises a multimode region, coupling the input waveguides to the output waveguides, through which the input signal propagates. This multimode region has two opposing sidewalls along its propagation axis, and at least one of the sidewalls has a non-linear taper inward toward the opposing sidewall. Amended Claim 13 is directed to a self-imaging 2 x 2 power splitter. As disclosed in the specification at page 5, devices according to the claimed invention can be used to minimize size, reduce optical coupling, reduce transmission losses, avoid manufacturing defects such as lithographic gap fill-in, and increase manufacturing tolerances.

No such device is disclosed in or suggested by Stockmann et al., either explicitly or inherently. As recognized by the Examiner, the Stockmann et al. reference discloses an optical coupler and a method for making the same comprising waveguides having a concave configuration or a semi-circular shape. However, Stockmann et al. discloses a fundamentally different random mode mixing coupler, and not a self-imaging multimode interference based coupler as required by the present claims.

The self- imaging behavior which forms the basis for the present invention involves the excitation of optical modes which propagate within a multimode waveguide. These modes are excited at the input of the multimode waveguide region by some input intensity distribution (for example, the Gaussian-like profile of a single mode fiber). In a manner unique to multimode interference devices, the modes propagate within the multimode waveguide region such that one or more copies of the original input intensity distribution reappear at various calculable positions along the length of the multimode waveguide region. Such behavior is not present, either explicitly or inherently, in the star couples described in Stockmann et al.

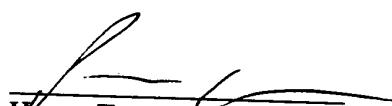
The position of the images within the claimed self-imaging multimode interference-based device is dependent upon the particular set of modes within the multimode region that is excited. In addition, the phase and intensity relations among this set of modes must be held approximately constant. Thus, as described at page 13 of the specification, the selection of the shape and the calculated length of the device is therefore critical in maintaining sufficient self-imaging. As a result, only certain types of tapered shapes and geometries (for example, parabolic) are allowed.

The above factors are not relevant to the design of the star couplers disclosed by Stockmann et al. In fact, column 2, lines 10-17 disclose that making the coupler "waisted" or tapered increases the mode mixing of the element within the multimode region. The star coupler uses this approach to randomize the distribution of modes that are excited within the device such that at the output of the device, the light is equally distributed into the output waveguides.

Accordingly, neither the explicit nor the inherent disclosure of Stockmann et al. anticipates or renders obvious the claims of the present invention. In view of the foregoing, the International Examiner's written opinion concerning the lack of novelty in claims 1-17 of the present application is respectfully traversed. It is submitted that the claims as presently drafted meet the requirements of PCT Article 33(2).

Respectfully submitted,

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Enclosures